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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
CREPEAU, JONATHAN

ART UNIT	PAPER NUMBER
1746	13

DATE MAILED: 06/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/839,786	MALLARI ET AL.
	Examiner	Art Unit
	Jonathan S. Crepeau	1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 May 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Response to Amendment

1. This Office action addresses claims 1-19. Claims 1-19 are newly rejected under 35 USC §112, first paragraph, and claims 1-16, 18, and 19 are newly rejected under 35 USC §103, as necessitated by amendment. Claims 1-4 and 6 remain rejected under the doctrine of obviousness-type double patenting over copending application 09/839,787. Claim 17 contains allowable subject matter. Accordingly, this action is made final.

Terminal Disclaimer

2. The terminal disclaimer filed on May 6, 2003 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of copending application 09/715,830 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1-19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant

art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1, 10, and 15 have been amended to recite that each of the one or more selectively doped regions has a resistivity "of no greater than about 0.05 Ωcm." There is not believed to be sufficient support for the recitation of "no greater than" in the application as originally filed. The specification discloses "approximately 50 mΩcm" on page 17, line 24, but does not provide adequate support for resistivities below that value that are encompassed by the newly claimed range. Accordingly, this range is considered to constitute new matter into the application.

Claim Rejections - 35 USC § 103

5. Claims 1, 3-10, 12-15, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over FR 2667728 in view of DE 19820756, in further view of Shackelford (*Mat. Sci. for Engineers*, 1992).

Regarding claims 1, 10, and 15, the French reference is generally directed to an electrode assembly for a fuel cell (see abstract, Figure 1). The assembly comprises anode and cathode electrode structures and an electrolyte (3, 9). Regarding claims 4, 10, and 15, each electrode comprises a plurality of pores (7) (see Fig. 2). Regarding claims 5, 7, 10, and 15, the pores have catalyst particles (8) uniformly dispersed thereon (see Fig. 2). Regarding claims 9, 14, and 19, the catalyst particles are made of platinum (see page 5, line 4 of translation).

The French reference does not expressly teach that the electrodes comprise silicon substrates having one or more selectively doped regions having a resistivity of no greater than

0.05 Ωcm, as recited in claims 1, 10, and 15, or that the electrodes comprise a plurality of acicular pores (claim 6).

The DE '756 publication is directed to perforated silicon workpieces that may be used as electrodes in fuel cells (see abstract). The workpiece has a porous region containing acicular pores (4) disposed across the top surface thereof (see Fig. 4). The silicon may be selectively n-doped (based on an oral translation of col. 2, line 61). Regarding claim 3, the substrate is derived from a silicon wafer (col. 1, line 64). Additionally, the top of the substrate comprises a "porous bulk matrix region," as recited in claims 10 and 15.

In Figure 12.2-1, Shackelford teaches that adding an n-type dopant to silicon provides extra electrons not needed for bonding to Si atoms, and further teaches on page 581 that the energy barrier to forming a conduction electron is less in an n-type material than in an intrinsic material, thereby increasing electrical conductivity.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the silicon substrate of the German reference as the anode and cathode catalyst supporting structures of the French reference. In the abstract, the German reference teaches that "the incompletely perforated second regions provide the perforated workpiece with increased strength and stability in an inexpensive manner, so that the risk of breakage during mounting is reduced." Accordingly, the artisan would be motivated by this disclosure to use the workpiece of the German reference as the catalyst supporting structure in the electrodes of the French reference.

Additionally, since high electrical conductivity is a beneficial attribute of a fuel cell electrode substrate component, the artisan would be motivated by the disclosure of Shackelford

to highly n-dope the silicon substrate of the German reference to increase its electrical conductivity and thereby decrease its resistivity. Accordingly, the claimed resistivity range of no greater than 0.05 Ωcm would be rendered obvious to a skilled artisan.

Regarding claims 8, 13, and 18, which recite that the catalyst particles are "chemisorbed," this limitation does not have to be accorded patentable weight because it does not appear to further limit the structure of the final product. See MPEP §2113.

Regarding the limitation in claim 15 that "the one or more selectively doped regions corresponds to the one or more discrete porous bulk matrix regions," this limitation would be rendered obvious by the disclosure of the DE '756 reference. The artisan may infer that the entire substrate of the reference is n-doped since there does not appear to be a disclosure of plural doped regions. It may also be ascertained that the entire top surface of the substrate comprises the porous matrix region. Thus, the porous matrix region would "correspond" to the selectively doped region, as recited in claim 15.

6. Claims 2, 11, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over FR 2667728 in view of DE 19820756 and Shackelford as applied to claims 1, 3-10, 12-15, 18, and 19 above, and further in view of Salinas et al (U.S. Patent 5,958,616).

The French reference does not expressly teach that the fuel cell is a direct methanol fuel cell.

The patent of Salinas et al. is directed to direct methanol fuel cell employing a liquid methanol reactant (see col. 1, line 30 et seq.).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the disclosure of Salinas et al. would motivate the artisan to feed a liquid methanol solution to the anode of the French reference. In column 1, line 35, Salinas et al. teach that "methanol is particularly attractive in this respect since it possesses a high energy density and, because it is a liquid at ambient temperatures like gasoline, much of the infrastructure is already in place for its safe storage and handling." Accordingly, the artisan would be motivated to feed a liquid methanol solution to the anode of the fuel cell of the French reference, thereby rendering the cell a direct methanol fuel cell.

Double Patenting

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ormum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).
A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 1-4 and 6 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 5, 6, 10, and 14 of copending Application No. 09/839,787 in view of DE 19820756 and Shackelford.

The claims of the '787 application do not recite that the silicon substrate comprises one or more selectively doped regions having a resistivity of no greater than 0.05 Ωcm, as recited in claim 1.

As stated above, the DE '756 publication is directed to porous n-doped silicon substrates that may be used as electrodes in fuel cells.

As also stated above, Shackelford teaches that adding an n-type dopant to silicon provides extra electrons not needed for bonding to Si atoms, and that the energy barrier to forming a conduction electron is less in an n-type material than in an intrinsic material, thereby increasing electrical conductivity.

Therefore, the instant claims would be rendered obvious over the claims of the '787 application because the artisan would be motivated by the disclosures of the German reference and Shackelford to highly n-dope the silicon substrate of the '787 claims to increase its electrical conductivity and thereby decrease its resistivity. Accordingly, the instant claims are considered to define an obvious variation of the invention recited in the '787 claims.

This is a provisional obviousness-type double patenting rejection.

Response to Arguments

9. Applicant's arguments filed May 6, 2003 have been fully considered but they are not persuasive. Applicants assert that the silicon workpieces of the German reference possess a resistivity value that is "far too great" to enable them to "function satisfactorily as current collectors in a fuel cell." However, while the workpieces may not meet Applicants' performance specifications when used in a fuel cell, the fact that the abstract of DE '756 discloses that the workpiece can be used in a "battery or fuel cell electrode" is sufficient guidance for an artisan to use them in such a capacity. The "satisfactory" performance of the current collectors is a subjective standard that varies between skilled artisans. Accordingly, Applicant's assertion that the workpieces cannot function "satisfactorily" as current collectors in a fuel cell is not persuasive.

Applicants further state that "[b]ecause the presently claimed invention is in all embodiments directed to unique 'electrode structures' (and not electrode assemblies or fuel cell systems), the Examiner's rational[e] has no applicability." However, it is submitted that both the German and French references are concerned with "electrode structures adapted for use with a fuel cell system," as presently claimed, and therefore, both references are analogous to the claimed invention. The preamble "an electrode structure" reads on a variety of structures and is not simply limited to one electrode. The claimed "structure" may be part of a broader combination such as an electrode assembly or a fuel cell, as is the case in the outstanding rejection. Accordingly, applicant's assertion is not persuasive.

Applicants further assert that "because the prior art invention being modified (i.e., fuel cell of FR 2667728) would result in an inoperative device (thus unsatisfactory for its intended

purpose), there can be no suggestion or motivation to make the Examiner's proposed modifications." In response, it is submitted that there is no evidence that the proposed modification would render the fuel cell of the French reference "inoperative." As noted above, Applicants have, through their research, defined a threshold resistivity value which they believe results in good fuel cell performance. However, another person of skill in the art might have a lower threshold of fuel cell performance, and thus would not be as concerned with the resistivity of the silicon substrate of DE '756. As stated above, the teachings of the DE '756 reference regarding the high strength and stability of the workpiece would motivate the artisan to make the proposed modification. In any event, there is no evidence that the use of the substrate of DE '756 in the fuel cell of the French reference would render the fuel cell "inoperable," particularly in light of the proposed modification of making the substrates of the German reference more electrically conductive by n-doping. Accordingly, the assertion of inoperability is not persuasive.

Allowable Subject Matter

10. Claim 17 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, and if the rejection under 35 USC §112, first paragraph set forth in this Office action was obviated.

11. The following is an examiner's statement of reasons for allowance:

12. The reasons for allowance of claim 17 were set forth in the previous Office action and remain applicable herein.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (703) 305-0051. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski, can be reached at (703) 308-4333. The phone number for the

organization where this application or proceeding is assigned is (703) 305-5900. Additionally, documents may be faxed to (703) 305-5408 or (703) 305-5433.

Any inquiry of general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

JSC

June 20, 2003

RANDY GULAKOWSKI
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